Abstract of the Disclosure

The retinal prosthesis test device is comprised of a thin wafer of glass made from nanochannel glass (NGC) with very small channels perpendicular to the plane of the wafer filled with an electrical conductor forming microwires. One surface of the glass is ground to a spherical shape consistent with the radius of curvature of the inside of the retina. The NGC is hybridized to a silicon de-multiplexer and a video image is serially input to a narrow , flexible micro-cable and read into a 2-D array of unit cells in a pixel-by-pixel manner which samples the analog video input and stores the value as a charge on a MOS capacitor. After all unit cells have been loaded with the pixel values for the current frame, a biphasic pulse is sent to each unit cell which modulates the pulse in proportion to the pixel value stored therein. Because the biphasic pulses flow in parallel to each unit cell from a global external connection, the adjacent retinal neurons are all stimulated simultaneously, analogous to image photons stimulating photoreceptors in a normal retina. A permanent retinal implant device uses a NGC array hybridized to a silicon chip, the image is simultaneously generated within each cell through a photon-to-electron conversion using a silicon photodiode. The photons propagate directly through into the backside of the device. Electrical power and any control signals are transmitted through an inductively driven coil or antenna on the chip. The device collects the charge in storage capacitors via the photon-to-electron conversion process, stimulates the neural tissue with biphasic pulses in proportion to the stored charges, and resets the storage capacitors to repeat the process.